Draft Environmental Assessment

BSEE BOP/Well Control Proposed Rule – AA11

4/8/2015

1. INTRODUCTION

1.1 Background and Overview

The Department of the Interior is mandated under the Outer Continental Shelf Lands Act (OCSLA) to manage the orderly leasing, exploration, development, and production of mineral resources on the Federal Outer Continental Shelf (OCS). The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource extraction with protection of human safety and marine and coastal environments.

The BSEE proposes to revise portions of existing regulatory subparts concerning offshore operations, incorporate certain industry standards, and create a new subpart, 30 CFR 250, Subpart G – Well Operations and Equipment, in order to consolidate existing regulations concerning common equipment and operations covering drilling, completions, workovers, and decommissioning on the OCS. This proposed rulemaking would create new subpart G, which would focus on blowout preventer (BOP) requirements, including incorporation of the latest industry standard document on BOPs, API Standard 53, Blowout Prevention Equipment Systems for Drilling Wells – Fourth Edition (2012). This proposed rule would address and implement multiple recommendations from the various Deepwater Horizon (DWH) investigations and invite public comment. Additional discussion on the background of this rulemaking is included in the preamble of the Notice of Proposed Rulemaking, Blowout Preventer Systems and Well Control, RIN 1014-AA11 (Docket ID: BSEE-2012-0016).

This environmental assessment (EA) discusses the purposes of and need for this proposed rulemaking, alternatives to this proposed rulemaking, and this proposed rulemaking's reasonably foreseeable environmental impacts in order to determine whether an Environmental Impact Statement (EIS) should be prepared. This EA was prepared in accordance with the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA). BSEE welcomes any comments on this EA and on any other documents associated with these proposed regulations.

1.2 Purpose and Need

The purpose of the proposed Federal action is to amend and update regulations under 30 CFR Part 250 regarding oil and gas well-control operations on the OCS, including those concerning BOP systems. Ensuring the integrity of the wellbore and maintaining control over well pressure and fluids during operations are critical aspects of ensuring human safety and protecting the environment. In particular, BOP systems can be the last defense against an uncontrolled discharge of oil or volatile gas into the environment. The proposed rule is needed to ensure that BSEE's regulations governing OCS oil and gas well operations, including drilling, completions, workovers, and decommissioning, require technology and practices that enhance safety and environmental protection.

Following the April 20, 2010 DWH explosion, blowout, and oil spill, multiple entities initiated investigations to determine the causes of the event and to make recommendations to reduce the likelihood of a similar event in the future.

The investigative bodies included:

- Department of the Interior and U.S. Coast Guard Joint Investigation Team
- National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling
- Chief Counsel for the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling
- National Academy of Engineering
- Chemical Safety Board

Each investigation outlined several recommendations to improve offshore safety. The requirements in this proposed rule are based, in part, on recommendations from these investigations.

The proposed rule includes reforms in the areas of well design, well control, casing, cementing, real-time well monitoring, and subsea containment. It also incorporates guidance from several Notices to Lessees and Operators (NTLs) and revises existing regulations related to drilling, workover, completion, and decommissioning operations to enhance safety and environmental protection. Many of the changes proposed in this rulemaking are designed specifically to improve wellbore integrity and well control in order to prevent incidents involving loss of well control.

2. PROPOSED ACTION AND ALTERNATIVES

This EA evaluates three alternatives, including a No Action Alternative, for amending and updating regulations under 30 CFR Part 250 regarding oil and gas well-control operations on the OCS, including those concerning BOP systems.

2.1 Alternative 1: No Action Alternative

This alternative would forgo any changes to the 30 CFR Part 250 regulations that apply to blowout preventer systems and other well-control practices. BSEE would continue to rely on existing regulations in combination with permit conditions, Deepwater Operations Plans (DWOPs), operator prudence, and industry standards.

2.2 Alternative 2: Preferred Alternative and Proposed Action

The proposed action is the promulgation of the proposed rule entitled Oil and Gas and Sulphur Operations on the Outer Continental Shelf – Oil and Gas Blowout Preventer Systems and Well Control, which would modify and/or consolidate the existing requirements under 30 CFR Part 250 Subparts A, B, D-G, P, and Q, to include 89 new or revised sections that would impose new requirements and incorporate new or improved industry standards. By improving safety, this rule has the potential to reduce the number and/or severity of oil spills on the OCS and, as a result, reduce the environmental impacts of oil spills on the OCS.
In summary, the proposed rulemaking would improve well control through the following:

1. Incorporate industry standards related to improving wellbore integrity and well control. Although the industry generally follows the published standards, compliance with those standards is not enforceable unless they are incorporated into regulations. Incorporating standards into regulations makes those standards requirements. The proposed rule would incorporate the following industry standards:

    a. American Petroleum Institute (API) Standard 53, Blowout Prevention Equipment Systems for Drilling Wells, 4th Edition;
    b. American National Standards Institute (ANSI)/API Specification (Spec.) 11D1, Packers and Bridge Plugs, 2nd Edition;
    c. API Recommended Practice (RP) 17H, Remotely Operated Tools and Interfaces on Subsea Production Systems, 1st Edition;
    d. API RP 2RD, Design of Risers for Floating Production Systems (FPSs) and Tension-Leg Platforms (TLPs), 1st Edition;
    e. ANSI/API Spec. 6A, Specification for Wellhead and Christmas Tree Equipment, 19th Edition;
    f. ANSI/API Spec. 16A, Specification for Drill-through Equipment, 3rd Edition;
    g. API Spec. 16C, Specification for Choke and Kill Systems, 1st Edition;
    h. API Spec. 16D, Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment, 2nd Edition;
    i. ANSI/API Spec. 17D, Design and Operation of Subsea Production Systems – Subsea Wellhead and Tree Equipment, 2nd Edition; and
    j. ANSI/API Spec. Q1, Specification for Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry, 8th Edition.

2. Revise the requirements for DWOPs to require free-standing hybrid risers (FSHR) for use with floating production, storage, and offloading (FPSO) units. The proposed rule would require the operator to provide additional information and to submit additional documentation on a proposed FSHR. This additional detail and documentation would include the following:

    a. Detailed descriptions and drawings of the FSHR and its buoy and tether system;
    b. Information on the design, fabrication, and installation of the FSHR and its buoy and tether system, including pressure ratings, fatigue life, and yield strengths;
    c. A description of how the operator complied with API RP 2RD, Recommended Practice for Design of Risers for Floating Production Systems (FPSs) and Tension Leg Platforms (TLPs);
    d. Detailed information regarding the tether system used to connect the FSHR to a buoyancy air can;
    e. Descriptions of the monitoring system and a monitoring plan to monitor the pipeline FSHR and tether for fatigue, stress, and any other abnormal condition (e.g., corrosion) that may negatively impact the riser or tether; and
    f. Documentation that the tether system and connection accessories for the pipeline FSHR have been certified by an approved classification society or equivalent, and verified by the Certified Verification Agent (CVA), as currently required by BSEE.

3. Revise sections currently in existing 30 CFR Part 250 subpart D – Oil and Gas Drilling Operations to include the following requirements:

    a. Submittal of equivalent circulating density (ECD) for wellbore fluid with the Application for Permit to Drill. The ECD is the effective fluid density exerted by a circulating fluid against the formation that takes into account the pressure drop in the annulus. The ECD is an important parameter in avoiding kicks and losses, particularly in wells that have a narrow window between the fracture gradient and pore pressure. This information is necessary for proper well drilling design and for BSEE to better review the drilling program.
    b. Improved safe drilling margin requirements. The planned safe drilling margins would be required to be between the proposed drilling fluid weights and the estimated pore pressures, and the lesser of estimated fracture gradients or casing shoe pressure integrity test. The safe drilling margins would need to ensure that:

        1. The static downhole mud weight is greater than the estimated pore pressure;
        2. Static downhole mud weight is a minimum of one-half pound per gallon below the lesser of the casing shoe pressure integrity test or the lowest estimated fracture gradient;
        3. The ECD is below the lesser of the casing shoe pressure integrity test or the lowest estimated fracture gradient; and
        4. Related hole behavior (*e.g.*, pressures, influx/loss of fluids, and fluid types) is considered when determining the pore pressure and lowest estimated fracture gradient for a specific interval.

    c. A wellhead description that includes the type of wellhead and liner hanger systems and a descriptive schematic. The descriptive schematic would include pressure ratings, dimensions, valves, load shoulders, and locking mechanisms, if applicable.
    d. Adequate casing or liner centralization to help ensure proper cementation.
    e. For operations using a subsea BOP or a surface BOP on a floating facility, the operator would be required to demonstrate the ability to control or contain a blowout event at the sea floor. The operator must have access to, and the ability to deploy, all equipment necessary to regain control of the well. Source Control and Containment Equipment (SCCE) means the capping stack, cap and flow system, containment dome, and/or other subsea and surface devices, equipment, and vessels whose collective purpose is to control a spill source and stop the flow of fluids into the environment or to contain fluids escaping into the environment.

4. Revise provisions in 30 CFR Part 250 subparts E and F to include requirements for:

    a. Adherence to newly incorporated API Spec. 11D1, Packers and Bridge Plugs, 2nd Edition;
    b. Production packer setting depth to allow for a sufficient column of weighted fluid for hydrostatic control of the well; and

c. A description, with calculations, of how the production packer setting depth was determined.

5. Revise provisions currently in existing 30 CFR Part 250 subpart Q to include requirements for packer and bridge plug design, casing bridge plugs, and decommissioning applications and reports, including the requirement that all packers and bridge plugs would have to comply with API Spec. 11D1, Packers and Bridge Plugs, 2nd Edition.

6. Create new Subpart G, and move common existing requirements from subparts D, E, F, and Q into this new subpart. This would create consistency among the requirements related to well operations (drilling, completion, workover, and decommissioning); *i.e.*, regardless of the type of operation being performed, the same basic requirements would apply. Included within this section, BSEE would revise the existing 7-day BOP pressure testing interval for well workovers and decommissioning operations to be consistent with the 14-day interval for drilling and completions.

7. Include additional or revised requirements in new Subpart G, such as the following:

    a. Rig and equipment movement reports for Mobile Offshore Drilling Units (MODUs), platform rigs, snubbing units, wire-line units used for non-routine operations, and coiled tubing units;
    b. Real-time monitoring by onshore personnel of the BOP system, fluid handling system of the rig, and downhole conditions. Having the real-time data available to onshore personnel would increase the level of oversight throughout operations. Onshore personnel could review data and help rig personnel better conduct operations in a safe manner. Also, onshore personnel would be able to assist the rig crew in identifying and evaluating abnormalities or unusual conditions while conducting operations. This section would require that BSEE be provided access to the real-time monitoring facility, upon request.
    c. BOP requirements for the following:

        i. Design and manufacture/quality assurance;
        ii. Accumulator system capabilities and calculations;
        iii. BOP and remotely operated vehicle capabilities such as: the remotely operated vehicle would have to be able to perform critical BOP functions, including opening and closing each shear ram, choke and kill side outlet valves, all pipe rams, and the Lower Marine Riser Platform disconnect under Maximum Anticipated Surface Pressure (MASP) conditions;
        iv. BOP shearing functions, including the installation of shear rams that center drill pipe during shearing operations, and two shear rams, one of which must be capable of sealing the wellbore under MASP after shearing;
        v. Increased maintenance and inspection requirements and qualifications and training for personnel that work on BOPs;
        vi. Failure reporting procedures per API standards, within timeframes specified by BSEE;

vii. Third-party verification of the design, maintenance, inspection, testing, and repair of BOP systems and equipment; and

viii. Additional submittals to BSEE including up-to-date schematics of the BOP and BOP control systems.

8. Incorporate guidance from several Notices to Lessees into a new subpart for the following:

   a. Global positioning systems (GPS) for MODUs, which would provide a robust and reliable means of monitoring the position and tracking the path, in real-time, of MODUs or jack-up rigs that may move during a severe storm;
   b. Ocean Current Monitoring, which would provide ocean current data needed for planning, designing, and operating MODUs, floating production platforms, and ancillary equipment, and ensure the sharing of ocean current data to develop a better understanding of ocean currents and bathymetry;
   c. Alternate Compliance in Safety Systems for Subsea Production Operations, which would allow the use of the Barrier Concept as the basis for using procedures or equipment in the safety systems for subsea production operations;
   d. Dropped Objects Plan for floating MODUs, which would help avoid prolonged damage to subsea infrastructure and aid the response of operators and BSEE to a dropped object;
   e. Standard Reporting Period for Well Activity Reports (WARs), which clarifies when to submit the WARs (Form BSEE-0133) and accompanying Form BSEE-0133S, Open Hole Data Report; and
   f. Information to be included in WARs and End of Operation Reports, including:

      i. information describing the operations conducted, any abnormal or significant events that affect the permitted operation;
      ii. verbal approvals;
      iii. the wells as-built drawings;
      iv. casing fluid weights;
      v. shoe tests;
      vi. test pressures at surface conditions; and
      vii. status of the well at the end of the reporting period.

2.3 Alternative 3: Proposed Action Plus Change in Frequency of Pressure Testing from 14 to 21 Days

This alternative would promulgate the requirements contained within the proposed rule with a change to the required frequency of BOP pressure testing from the existing regulatory requirements (*i.e.,* once every 7 or 14 days depending upon the type of operation) to once every 21 days for all operations.

2.4 Alternatives Considered but not Carried Forward for Further Analysis

1. BSEE also considered another alternative that would eliminate certain proposed requirements in the following provisions of the proposed rulemaking (as described in part 2.2 above), which could result in small increases in vessel traffic and in associated environmental consequences (as discussed in part 4.2 below):

   § 250.462 What are the source control requirements?
   § 250.734 What are the requirements for a subsea BOP system?

   Compliance with those proposed provisions could require some additional vessel traffic to and from OCS well sites (*e.g.*, to ensure that SCCE and BOP equipment meet the proposed new requirements), and exclusion of those provisions could avoid the potentially negligible adverse environmental effects (*e.g.*, increased air emissions, noise levels) that could result from additional vessel traffic. Exclusion of those provisions could also result in some potential cost savings for OCS operators. However, exclusion of those provisions under such an alternative would substantially reduce the potential beneficial environmental consequences that would result from Alternative 2 (and Alternative 3) and would fall far short of achieving the main purpose and need of the proposed rule; *i.e.*, to prevent loss of well control and prevent or minimize potentially catastrophic oil spills.

2. Additionally within § 250.734, BSEE considered including requirements for industry that would be associated with the installation of technology capable of severing any components of the drill string (excluding drill bits). Including such a severing requirement would provide additional protection against the potential loss of well control by requiring that operators install supplemental technology that ensures all components of a drill string, including those components that cannot be sheared with current shear rams, could be severed in an emergency to allow the well to be safely shut-in, thereby reducing the risk of a loss of well control. BSEE provides extensive and robust discussion of severing in the preamble of the rulemaking, including seeking input on whether such a provision should be included in the final rule. Although these requirements were not included within the proposed regulatory text, BSEE nonetheless considered them and determined that they would not result in operational changes and would likely have no adverse environmental impacts as a result. Given this analysis, BSEE determined that a separate alternative was not needed to assess the impacts of including this requirement in the final rule.

3. AFFECTED ENVIRONMENT

The vast majority of active OCS oil and gas operations take place in the Gulf of Mexico OCS region, while fewer but still significant operations are conducted in the Pacific OCS region (BOEM 2012). Although there is relatively little current operational activity in the Alaska OCS region, especially in the Arctic areas of that region, there is the potential for significant future operations in that region. Moreover, the environment and ecosystems in the Arctic areas and other parts of the Alaska region are particularly sensitive (BOEM 2012). Thus, while the coastal and marine environments of the Pacific and Gulf of Mexico regions are proportionally most relevant to this proposed rulemaking in the near term, this EA also considers the potential impacts of the proposed action on the Arctic OCS. Descriptions of baseline environmental and socioeconomic conditions of the Gulf of Mexico, Pacific, and Alaska OCS planning areas may be found in the BOEM 2012-2017 OCS Oil and Gas Leasing Program programmatic environmental impact statement (BOEM 2012) and the Minerals Management Service programmatic environmental impact statement for alternative energy development and alternative use of facilities on the OCS (MMS 2007).

In these regions, an oil spill following a loss of well control could affect:

- Air quality;
- Water quality;
- Marine and terrestrial mammals;
- Marine and coastal birds;
- Sea turtles;
- Fish and shellfish;
- Coastal, nearshore, and seafloor habitats;
- Areas of special concern, including essential fish habitat;
- Sociocultural systems and environmental justice;
- Population, employment, and regional income;
- Tourism and recreation;
- Commercial and recreational fisheries;
- Subsistence hunting and fishing;
- Land use and existing infrastructure; and
- Archeological resources.

4. ENVIRONMENTAL CONSEQUENCES

4.1 Alternative 1: No Action Alternative

Adopting the No Action alternative would mean that the proposed revisions to 30 CFR Part 250 would not be incorporated into federal regulation, and thus the intended benefits of the rulemaking would not be realized. The underlying purpose of the proposed rulemaking is to enhance the safety of oil and gas operations on the OCS, thereby reducing the likelihood of a loss of well control and a discharge of oil into the environment. This, in turn, would also reduce the likelihood of potential injury, loss of life, and environmental and socioeconomic impacts.

Conversely, under the No Action Alternative, no reduction would be expected in the likelihood of a loss of well control and any subsequent discharge of oil. A loss of well control during well operations on an OCS facility can cause human injury or loss of life, as well as adverse economic and environmental impacts. The volume of oil resulting from a worst case discharge at a well may exceed volumes from other potential spill sources, such as pipelines or vessels (BOEM 2012). For example, a spill from a pipeline at or near the seafloor is accessible for repairs, and the flow into the pipeline can be shut-in. In contrast, a loss of well control and a failure of the BOP system may result in the discharge of gas, condensate, oil, sand, or water that is more difficult to contain and shut-in, potentially compromising safety and resulting in a significant oil spill.

A catastrophic oil spill resulting from a loss of well control and BOP failure can affect a variety of biological, socioeconomic, and sociocultural resources over extensive coastal and offshore areas. Impacts that may occur include:

- *Air Quality*: Impacts on air quality may result from the emission of pollutants from the oil and from *in situ* burning, and from the dispersant mist resulting from the application of chemical dispersants on the oil (BOEM 2012). Evaporation of spilled oil also would cause increases in volatile organic compounds (VOCs). The magnitude and extent of any air quality impacts would depend on the size, location, and duration of the spill, and on local meteorological conditions such as wind speed and direction. Spreading of spilled oil and action by wind, waves, and currents would act to disperse and thus reduce VOC concentrations. Over time, air quality would return to pre-spill conditions. The *in situ* burning of spilled oil would generate a plume of black smoke and emissions of nitrogen oxides[1] (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter[2] (PM_{10}, and $PM_{2.5}$) that would temporarily affect air quality. Smoke from burning crude oil also would contain polycyclic aromatic hydrocarbons (PAHs). After the burn, air quality would return to pre-burn conditions.

- *Water Quality*: An oil spill will adversely affect water quality by introducing hydrocarbons into the water column. Weathering processes that transform oil, such as volatilization, emulsification, dissolution, chemical oxidation, photo-oxidation, and microbial oxidation, may reduce water quality impacts of oil spills (NRC 2003; NOAA 2005). Because oil is generally less dense than water, it would tend to float on the sea surface, and lighter oil fractions containing BTEX[3] would evaporate from the surface and, therefore, would not be a continuing source of potential water contamination. Following a spill, light crude oils can lose as much as 75% of their initial volume to evaporation as the lighter components (*e.g.*, BTEX) change from the liquid to the gas phase; medium-weight crude oils can lose as much as 40% (NRC 2003b). In the event of a spill occurring under ice cover, oil would be trapped and essentially remain unchanged until ice breakup occurred and the ice began to melt. The volatile compounds from such a spill would be more likely to freeze into the ice within hours to days, rather than dissolve or disperse into the water below the ice.

  The impacts on water quality will depend upon the type of oil spilled; the size, location, and duration of the spills; weather conditions in the spill area; and remediation activities. Small spills would likely result in short-term, localized impacts, while impacts from large spills could persist for an extended period of time (BOEM 2012). The potential for more

[1] The combination of nitrogen oxide (NO) and nitrogen dioxide (NO_2) is referred to as NO_x.
[2] PM_{10} and $PM_{2.5}$ refer to particulate matter of 10 micrometer and 2.5 micrometer mean aerodynamic diameter, or less, respectively.
[3] BTEX refers to a mixture of benzene, toluene, ethyl benzene, and xylene.

widespread and long-term water quality impacts may be expected to be greater in Alaskan waters, especially under ice-cover conditions. On the Alaska OCS, winter conditions (*e.g*., complete ice cover and extremely cold conditions) could substantially complicate spill response, given current spill control and remediation technologies. The speed of natural recovery in the Alaska OCS, as compared to GOM waters, could be slowed by the persistence of oil in cold water temperatures and under ice cover. Additional effects on water quality would occur from response and cleanup vessels, *in situ* burning of oil, dispersant use, discharges and seafloor disturbance from relief well drilling, and activities on shorelines associated with cleanup, booming, beach cleaning, and monitoring (BOEM 2012).

- *Marine and Terrestrial Mammals*: Oil spills may result in the direct and indirect exposure of mammals and their habitats to oil (BOEM 2012, NOAA 2012). Marine mammals can be exposed to chemicals in oil or dispersants in several ways, such as internal exposure (by consuming oil or contaminated prey, or inhaling volatile oil and dispersant-related compounds); external exposure (by swimming in oil or dispersants, and having oil or dispersants directly on the skin and body); and maternal transfer of contaminants to embryos. Fouling of fur of some species (*e.g*., sea otter, polar bear, and fur seal) could affect thermoregulation and reduce survival. Terrestrial species may be exposed if a spill reaches their terrestrial and aquatic habitats. When oil reaches land, it can severely impact coastal and estuarine habitats such as marshes, mudflats, mangrove stands, and beaches (BOEM 2012, NOAA 2012). Terrestrial mammals that use these habitats (such as beach mice in the GOM) are at risk from direct fouling by the oil, as well as exposure via consumption of prey contaminated by the oil spill. The magnitude of effects to marine and terrestrial mammals from oil spills would depend on the location, magnitude, duration, timing, and volume of the spills; the habitats affected by the spills (*e.g*., marine, coastal, and estuarine habitats); and the species exposed. Overall, impacts on marine mammals from an oil spill could include physical injury or death; behavior disturbances; lethal or sublethal toxic effects; and loss of reproductive, nursery, feeding, and resting habits (BOEM 2012). Specifically, in Alaska, the greatest risk to marine mammals would be associated with large spills reaching rookeries and haul out locations where large numbers of individuals could be exposed and population-level impacts could occur (BOEM 2012).

  Response activities, such as collecting and burning oil at sea, skimmer operations, boom deployment, the use of dispersants, berm construction, and boat traffic also could directly injure marine mammals or cause behavioral changes. Terrestrial habitats used by some species may be negatively impacted by response activities, such as shoreline cleanup efforts, placement of booms, and siting of land-based staging areas (BOEM 2012).

  In addition, the discharge of condensate, oil, sand, or water from a loss of well control could result in increased turbidity and concentrations of total suspended solids in the water column, which could displace marine mammals from the drill sites and could adversely affect habitat and prey within and around the drill site. Such an effect could be of particular concern in the Arctic and other areas of the Alaska OCS. In the Arctic, subsistence hunters, who rely on traditional ecological knowledge, have expressed concern that whales, particularly migrating bowhead whales, are capable of detecting the odors from discharges and will avoid areas where these discharges occur, which in turn would significantly impact subsistence whale hunting (BOEM 2012).

- *Marine and Coastal Birds:* Birds may be exposed to, and affected by, oil or dispersants in a number of ways (BOEM 2012, NOAA 2012). External exposure may occur if the birds swim or dive through floating oil, or utilize oiled beaches and marshes. External exposure results in the oiling of feathers, and oiled birds can lose the ability to fly, dive for food, or float on the water, which can lead to drowning. Oiling of feathers interferes with the water repellency of feathers and can lead to hypothermia. Internal exposure may occur through the incidental ingestion of oil as the birds preen and try to clean their feathers, through ingestion of contaminated food and media, and through inhalation of volatile oil-related compounds. Maternal transfer of contaminants from exposed adult females to embryos and eggs may also occur. Internal exposure may result in a variety of lethal and sublethal physiological, metabolic, developmental, and behavioral effects. Internal exposure may lead to reduced survival and reproductive success (*e.g.*, reduced hatching of eggs and survival of hatchlings) (BOEM 2012, NOAA 2012).

  The magnitude and ecological importance of any effects to marine and coastal birds would depend upon the size, location, duration, and timing of the spill; the species and life stages of the exposed birds; and the size of the local bird population (BOEM 2012). Exposure to spills in deep water would be largely limited to pelagic birds. Spills that reach coastal habitats could affect the greatest variety and number of birds, including shorebirds, waterfowl, wading birds, gulls, and terns. Spills reaching onshore locations have the greatest potential for affecting the greatest number of birds, especially if a spill occurs in or reaches an area where birds have congregated and are carrying out important activities (such as nesting, molting, and staging areas for some waterfowl and shorebirds).

- *Sea Turtles:* Oil spills may expose one or more sea turtle life stages to oil or its weathering products (BOEM 2012, NOAA 2012). Internal exposure may occur through the incidental ingestion of oil, feeding on contaminated food, or inhaling volatile oil and dispersant-related compounds, as well as maternal transfer from exposed adults to eggs. External exposure may occur as juveniles and adults swim in oil or dispersants which then adhere directly to the skin and body, while eggs and hatchlings may be exposed if nest sites become oiled. Exposed hatchlings, juveniles, and adults may incur a variety of lethal or sublethal effects. Oil reaching nests may reduce egg hatching and hatchling survival and inhibit hatchling access to water, while the presence of oil on nesting beaches may affect nest site access and use by adult turtles (BOEM 2012, NOAA 2012).

  The magnitude of effects from an oil spill will depend on the location, timing, duration, and volume of the spill; the environmental settings of the spills; and the species and life stages of sea turtle exposed to the spills. A catastrophic spill could affect the greatest number of individuals, life stages, and habitats, and result in major impacts to the affected species and potentially lead to population-level effects (BOEM 2012). In addition to chemical exposure, response activities such as the use of dispersants, collecting and burning oil at sea, skimmer operations, boom deployment, berm construction, and onshore equipment use and increased light at night on or near nesting beaches, could directly injure sea turtles, block access to turtle nesting beaches, and/or cause behavioral changes. Furthermore, BSEE recognizes that most species of potentially impacted sea turtles are listed under Endangered Species Act, and BSEE considered this when evaluating the potential impacts described above.

- *Fish and Shellfish:* Fish and shellfish may be exposed to oil and dispersants through a variety of pathways, including direct dermal contact (*e.g.*, swimming through oil and dispersants or waters with elevated dissolved hydrocarbon concentrations and other constituents), ingestion (*e.g.*, feeding on contaminated food and filter-feeding in contaminated water), and respiration (*e.g.*, elevated dissolved contaminant concentrations in water passing over the gills). Recent results from studies looking at potential synergetic effects of dispersants in oil exposure have suggested that the dispersants make it easier to move hydrocarbons across membranes, and thus may enhance exposure (see BOEM 2012, NOAA 2012).

  Hydrocarbons can have a range of effects on fish depending on the concentration, the length of exposure, and the life history stage of the fish involved (BOEM 2012, NOAA 2012). Exposure to an oil spill could affect fish populations by causing mortality of eggs, larvae, juveniles, or adults; triggering abnormal development; impeding the access of migratory fishes (*e.g*., salmon and herring) to spawning habitat; altering behaviors; displacing individuals from preferred habitat; reducing or eliminating prey populations available for consumption; impairing feeding, growth, or reproduction; causing adverse physiological responses; increasing susceptibility to predation, parasitism, diseases, or other environmental perturbations; and increasing or introducing genetic abnormalities. Water quality changes resulting from an oil spill can also adversely affect habitat quality and quantity for fish and shellfish. A catastrophic spill has the potential to cause the loss of a year class, affecting future stock populations.

  A large oil spill in Alaskan waters may have greater ecological consequences than a comparable spill in temperate areas because oil is likely to persist longer in Alaska due to the colder water temperatures (BOEM 2012). In addition, in the Alaska OCS region in winter, fish must contend with reduced light, seasonal darkness, prolonged low temperatures and ice cover, and scarcer food resources, which affect primary and secondary productivity. Thus, most of a fish's yearly energy needs must be satisfied during the brief Arctic summer, and an uncontrolled discharge of oil in such areas during the summer drilling season could have even greater effects than in other regions where seasonal differences in environmental conditions do not affect food resources and productivity as dramatically as in the Arctic.

- *Coastal, Nearshore, and Seafloor Habitats*: Oil and dispersants are transported on the surface of the water column by wind and currents. For oil to become incorporated into bottom sediment, oil particles must either weather to a dense asphaltic material that can then sink, or absorb or adhere to heavier particles and sink. Such particles may include marine detritus (non-living particulate organic material) or inorganic sediment (*e.g.*, sediment particulate introduced to the Gulf from the Mississippi River). Oil that has been deposited onshore and mixed with sand and sediment may be resuspended and washed back out via tidal action, eventually settling to the bottom (BOEM 2012, NOAA 2012).

Coastal, nearshore, and benthic habitats exposed to an oil spill may incur minor to major impacts associated with reduction in habitat quality and service (*e.g*., loss of use as spawning grounds, reduced ability to provide food resources) and secondary impacts to the biota that rely on affected services. The magnitude of potential impacts to exposed habitats would depend on a variety of factors, including the location, size, timing, and duration of the spill; the specific type of habitat exposed; the effectiveness of remediation efforts; existing environmental conditions (*e.g*., vegetation, substrate type, ice cover); and natural localized erosion and deposition patterns. The effects of small spills would generally be localized and relatively short-term. In the event of a large or catastrophic spill, however, habitats over a much greater geographic area may be affected and may incur more severe impacts where oil is concentrated. In some cases, full recovery of oiled habitats could take many years, and habitats such as coastal wetlands may not fully recover even following remediation (BOEM 2012, NOAA 2012).

- *Areas of Special Concern, Including Essential Fish Habitat*: Areas of Special Concern include Marine Protected Areas, National Marine Sanctuaries, and National Seashores, Reserves, and Refuges (see BOEM 2012). Areas of Special Concern also include military use areas and areas designated as essential fish habitat (EFH). An oil spill reaching sensitive coastal habitats could affect national parks, national wildlife refuges, national estuarine research reserves, or national estuary program sites (BOEM 2012). Impacts could result from both oiling of the shoreline and mechanical damage during the cleanup process. Potential effects include reduced ecological services, impacts to habitats and resident biota, and reduced human use (*e.g*., subsistence use, recreation and tourism, commercial and recreational fisheries, and military training). The magnitude of the potential effects would depend on the location, size, duration, and timing of a spill; type of area affected (national seashore vs. military training area); the weather conditions at the time of the spill; the nature and effectiveness of response operations; and other environmental conditions (*e.g*., wave conditions or presence of sea ice) at the time of the spill (BOEM 2012).

- *Sociocultural Systems and Environmental Justice*: Humans can be affected by an oil spill through contact with the contaminants (via inhalation, skin contact, or intake of contaminated foods); through reduced availability of subsistence resources; through interference with subsistence harvest patterns; and by stress due to fears of long-term implications of the spill. Physiological effects may include a variety of respiratory symptoms; irritation of the eyes and mucous membranes; and increased incidence of headaches, nausea, and dizziness.

  Low-income and minority populations, and especially Native Alaskan communities on the Arctic coast, could be affected to a greater extent than the general population because of their dietary reliance on marine mammals and wild coastal resources, their reliance on these resources for other subsistence purposes such as sharing and bartering, their limited flexibility in substituting wild resources with those purchased, and their spiritual and cultural beliefs and practices. Thus, any significant environmental impacts on fish and mammal subsistence resources from oil spills would have major sociocultural impacts, primarily associated with disruption of subsistence activities (BOEM 2012).

- *Population, Employment, and Regional Income*: The immediate impact of a large oil spill may include the loss of employment and income, reduced property values, increased cost of public service provision, and possible shortages of commodities or services. Longer-term impacts could affect commercial and recreational fisheries, and/or tourism if these activities were to suffer due to the real or perceived impacts of the spill. Expenditures associated with potential spill response and cleanup activities could create short-term employment and income in some parts of the affected coastal region(s) (BOEM 2012).

- *Tourism and Recreation*: Potential impacts on recreation and tourism resulting from an oil spill would likely include direct impacts (*e.g*., oil contamination of a beach), access restrictions to a particular area (*e.g*., no diving or fishing while cleanup is being conducted), and aesthetic impacts. These impacts could persist for several months or longer, pending cleanup completion and any required habitat restoration. The extent and duration of impacts would depend on the location, size, duration, and timing of the spill and associated cleanup activities, and on the effectiveness of response operations. Because oiled coastal sediments are often removed via mechanical means, such shoreline activity would effectively close the area to public use for the duration of cleanup operations. If restoration is required (*i.e.*, to restore the proper beach profile), additional time may be required before public access is allowed (BOEM 2012).

- *Commercial and Recreational Fisheries*: The effects of oil spills on commercial and recreational fisheries would depend on the location, timing, duration, and volume of spills, in addition to other environmental factors. Small spills would be unlikely to have a large effect before dilution and weathering reduced concentrations and therefore would not have long-term effects on commercial and recreational fisheries. If a large oil spill were to occur, commercial and recreational fisheries could incur costlier and more long-term effects. The potential for oil-soaked fishing gear and potentially contaminated fish may reduce commercial and recreational fishing efforts. Very large spills could also indirectly affect fisheries by degrading habitats that are critical for the survival of target species, but would only be serious if they led to severe declines in target species populations. Highly mobile fish species (tunas, sharks, and billfish) could move away from surface oil spills in deep water, disrupting fishing efforts (BOEM 2012, NOAA 2012).

- *Land Use and Existing Infrastructure*: A large oil spill could at least temporarily alter land use in areas where the spill contacts the shore, but may not result in long-term changes (BOEM 2012). There could be an immediate but temporary change in existing land use at the impacted areas associated with beach closures, coastal access restrictions, and restrictions on visitation, hunting, and fishing during spill containment and cleanup, as well as during any post-spill habitat restoration efforts. The magnitude and duration of impacts would depend upon the location, size, timing, and duration of the spill and the existing land use at the spill location.

- *Archeological Resources*: Oil spills could affect coastal historic and prehistoric archeological resources and could result in an unavoidable loss of information and physical damage of oiled artifacts and sites (BOEM 2012). The level of this impact would depend on the significance and uniqueness of the information lost. Prehistoric sites in all regions occur frequently along the mainland coast and barrier islands, and along the margins of estuaries, bays, and lagoons; thus, any spill that contacts these areas could involve a potential impact on a prehistoric site.

4.2 Alternative 2: Preferred Alternative and Proposed Action

The potential environmental consequences of a loss of well control discussed above in Alternative 1 also apply to Alternative 2. However, due to the additional safety and reliability provisions in Alternative 2, the likelihood and/or severity of a loss of well control and discharge of hydrocarbons under Alternative 2 is expected to be less than that under Alternative 3 and further less than that under Alternative 1. Accordingly, over time, the resulting adverse human health, socioeconomic, and environmental effects described in section 4.1 above would be expected to be less under Alternative 2 than under Alternative 3, and further less than under Alternative 1, due to fewer incidents of loss of well control.

Implementing certain provisions of the proposed rule has the potential to lead to environmental impacts. For example, implementing the proposed SCCE requirements may lead to an increase in vessel traffic required to support such capabilities and to the potential environmental consequences of such traffic; *e.g*., any increase in vessel traffic may lead to some additional air emissions and increased noise levels (BOEM 2012). However, BSEE estimates that any increase in vessel traffic would be *de minimis* due to operators scheduling routine operations in conjunction with these requirements in order to optimize time and minimize costs. Consequently, any increase in vessel traffic resulting from the provisions of the proposed regulations requiring SCCE would be a minor fraction of ongoing traffic levels in each of the three BSEE OCS regions. (For example, the 2012-2017 OCS Leasing Program estimated traffic of 300-600 vessels/week in support of routine operations in the Gulf of Mexico) (BOEM 2012). Since any additional SCCE-related vessel traffic would represent a very small incremental increase over routine vessel traffic, it would have negligible effects on the potential environmental consequences, such as air emissions and noise levels. However, we welcome comments on the potential impacts of the proposed provisions on any of the regions.

BSEE has also examined whether the proposed reduction in BOP testing frequency for workover and decommissioning operations— from once every 7 days to once every 14 days—potentially could lead to an increase in the likelihood of a loss of well control, and an increase in the associated potential environmental impacts, should the reduced testing lead to a BOP failing to operate properly when actually needed. On the other hand, reducing the BOP testing frequency for workovers and decommissioning potentially could increase equipment durability somewhat, through a reduction of the number of times the BOP is subjected to repetitive testing during those operations. Increased durability might partially offset the potential risk that the equipment will not perform properly when needed due to decreased testing frequency.

In addition, any potential increase in the risk that a BOP would fail to operate properly when needed could be offset to some degree because reducing the frequency of BOP testing could reduce the risk of potential environmental consequences (such as a non-catastrophic oil spill) directly related to performance of the tests themselves. For example, each time such a test is performed, there is some risk that an error could occur or that some piece of equipment could fail; reducing the frequency of such tests (and, thus, the number of tests) would decrease the number of possible opportunities for such hazards to occur.

Of importance, the proposed testing interval of 14 days for workover and decommissioning operations simply brings those activities into alignment with the 14-day testing interval that has long been required for all other well operations (*e.g.,* drilling and completions). Given the extensive experience with a 14-day BOP testing requirement for those well operations, BSEE does not expect that aligning the workover and decommissioning BOP testing interval with the testing interval for all other operations would result in a heightened risk of the loss of well control or entail other significant environmental consequences.

Many of the other changes proposed in Alternative 2 are designed specifically to improve wellbore integrity and well control, with the intent of preventing incidents involving loss of well control. Although it is not possible to estimate the level of reduction in BOP failure rates that could result with adoption of the proposed rulemaking, implementation of Alternative 2 is expected to reduce the likelihood of well control incidents and spills (catastrophic or otherwise) compared to the likelihood under Alternative 3 and to reduce such likelihood even further compared to Alternative 1. Adoption of Alternative 2 is expected to benefit environmental health to a greater degree than Alternative 1 through the avoidance of potential adverse effects associated with losses of well control and discharges of hydrocarbons that might otherwise occur.

4.3 Alternative 3: Proposed Action Plus Change in Frequency of Pressure Testing from 14 to 21 Days

This alternative would promulgate the requirements contained within the proposed rule but would change the required frequency of BOP pressure testing from the existing regulatory requirements (*i.e.,* once every 7 or 14 days depending upon the type of operation) to once every 21 days for all operations. The only variation from Alternative 2 would be the longer interval between BOP pressure tests. This variation could potentially affect the risk of a loss of well control and discharge of hydrocarbons, as compared to Alternatives 1 and 2, in several ways.

Due to the additional safety and reliability provisions in Alternative 3, the likelihood of a loss of well control and discharge of hydrocarbons (*e.g.*, from failure of a BOP to operate correctly when needed to prevent a blowout) under Alternative 3 is lower than that under Alternative 1. However, as compared to Alternative 2, the reduced frequency of BOP testing under Alternative 3 potentially could increase the likelihood of a loss of well control and catastrophic discharge of hydrocarbons (and an increase in the associated potential environmental impacts) should the reduced testing lead to a BOP failing to operate properly when actually needed. On the other hand, reduced pressure testing frequency potentially could increase equipment durability somewhat, through a reduction of the number of times the BOP is subjected to repetitive testing, and thus might partially offset the potential risk that the equipment will not perform properly when needed.

In addition, under Alternative 3, the potential increase in the risk that a BOP would fail to operate properly when needed, due to decreased testing frequency, could be offset to some degree because reducing the frequency of BOP testing could reduce the risk of potential environmental consequences directly related to performance of the tests themselves (as discussed under Alternative 2). In the preamble to the proposed rule, BSEE has requested additional information on these issues associated with testing frequency, operational safety, and equipment durability. Overall, however, based on our existing data, the potential positive consequences of reduced testing frequency under Alternative 3 do not outweigh (as compared to Alternative 2) the potential increased risk and related consequences of a blowout and catastrophic oil spill that might occur if a BOP fails to operate, when needed, as a result of reduced testing.

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